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UTILITY PATENT APPLICATION

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for new and useful invention entitled:

RE-USABLE NON-METALLIC CONSTRUCTION FORMING SYSTEM

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RE-USABLE NON-METALLIC CONSTRUCTION FORMING SYSTEM

FIELD OF THE INVENTION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/437,380, filed December 31, 2002, and U.S. Provisional Application No. 60/491,355, filed July 31, 2003, the entire contents of which are herein incorporated by reference. The present invention relates generally to a construction forming system and more specifically to a poured forming system retained using re-usable light-weight plastic forms.

BACKGROUND OF THE INVENTION

[0002] Poured forming systems are well known for the formation of building structures including foundations, walls, floors, and roofs. Typically, a form is created for receiving a flowable, hardenable material, most typically a cementitous material such as concrete. The form includes a face surface for contacting the flowable material.

[0003] Most often the form is produced predominantly from wood. The flowable material contacts a generally planar wooden face and cures into its final orientation. However, wood naturally contains oil. The oil mixes with the flowable material, separating any water contained within the flowable material away from the material. The separated water is absorbed into the wooden form, causing water damage to the wooden form. Furthermore, water stains the front surface of the structure before the structure can completely cure. Additionally, the wooden form is often destroyed upon separation from the flowable material, but includes the advantage of low cost.

[0004] More recently aluminum forms have been used in place of the wooden forms. An advantage of the aluminum forms is that they may include one of a limited number of patterns lightly etched into the face, such that when the flowable material contacts the etched surface, it takes on the mirror image of the pattern. However, aluminum forms have a number of significant disadvantages. For example, the forms are heavy, complicating assembly and disassembly as well as transport. Further, while reusable, the etched patterns are easily subject to damage, and may be readily

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gouged or otherwise defaced. Moreover, the forms are very expensive to manufacture, particularly with respect to providing a consistent pattern from form to form as they are secured together. Yet a further problem is that only a very limited number of simple, lightly etched patterns may be used, which does not extend more than a slight percentage of the total thickness of the form.

[0005] To address the problems of both wooden and aluminum forms, at least one company has created a thin form liner that is disposed between the face of a traditional form and the flowable material. The form liner typically includes a lightly etched pattern. Once the material has cured and the form is removed, the liner is then stripped away from the flowable material. Such a liner is subject to a number of major problems. In view of its limited thickness, it readily expands or contracts because of changes in temperature. As a result, the liners can only be used in a very limited temperature range without damage to the liners or aberrations to the pattern itself. Further, even when used at optimal temperatures, many flowable materials such as type 3 concrete with accelerators create high heat during the curing process, which damages the liner. The liners are also difficult to secure to the face of the form, which results in non-optimal pattern distribution from form to form. As with the aluminum forms, only a limited number of thinly etched patterns may be used. Moreover, the use of a deeper pattern is often not possible without damage to the liner or at the very least significant distortion to the pattern.

SUMMARY OF THE INVENTION

[0006] The present invention relates to a form for use with a flowable construction material. The form includes a base portion having a front and rear face and a reinforcement matrix secured to the rear face. At least the base portion of the form is a non-metallic, non-wooden material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1A is a front view of a form in accordance with the present invention.

[0008] FIG. 1B is a cross-sectional planar view of the form taken along lines 1A-1A in Figure 1.

[0009] FIG. 2A is a rear view of a form in accordance with the present invention.

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[0010] FIG. 2B is a cross-sectional planar view of the form taken along lines 2A-2A in Figure 2.

[0011] FIG. 3 is a perspective view of an alternate embodiment of the form in accordance with the present invention.

[0012] FIG. 4 is a perspective view of the alternate form in accordance with the present invention.

[0013] FIG. 5 is a perspective view of a further alternate embodiment of the form in accordance with the present invention.

[0014] FIG. 6 is a perspective view of the further alternate form in accordance with the present invention.

[0015] FIG. 7 is a rear view of a wall forming system in accordance with the present invention.

[0016] FIG. 8 is a perspective view of the wall forming system, showing a portion of the retention mechanism in accordance with the present invention.

[0017] FIG. 9 is a perspective view of the wall forming system, showing an alternative embodiment of the retention mechanism.

[0018] FIG. 10 is a perspective view of the wall forming system, showing a further alternative embodiment of the retention mechanism.

[0019] FIG. 11 is a perspective view of a finished wall using the form system of the present invention.

[0020] FIG. 12 is a perspective view of a hollow wall forming system using opposing sets of forms separated by spacers for receiving flowable material.

[0021] FIG. 13 is a different perspective view of the system of Figure 12.

[0022] FIG. 14 is a perspective view of an isolated alternate spacer in accordance with the present invention.

[0023] FIG. 15 is a perspective view of the wall forming system, illustrating the alternative spacer in an installed position.

[0024] FIG. 16 is a side view of a further alternate spacer using an opening through the faces of opposing forms in accordance with the present invention.

[0025] FIG. 17 is a perspective view of a curb form in accordance with the present invention.

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DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Referring now to the Figures, wherein like reference numerals refer to like elements throughout the several figures, Figures 1A and 2A illustrate front and rear faces 22, 24 of an innovative construction form 20 made from a non-metallic material, while Figures 1B and 2B are taken along lines 1A-1A and 2A-2A, respectively, to show a top and bottom view of form 20.

[0027] More specifically, Figure 1A illustrates front face 22 of form 20, with a series of cavities 26 extending inwardly from the otherwise generally planar front face 22. However, it can be appreciated that cavities 26 may also extend outwardly from front face 22. As discussed in greater detail below, cavities 26 can be deep. Front face 22 includes a base portion 28 of form 20. In significant contrast with the prior art, cavities 26 may extend on the order of one-half to three-quarters or even more of the total overall thickness "T" of form 20. Figures 1B and 2B illustrate an example of the depth of cavities 26. The illustrated form 20 is intended to mimic rocks extruding from rear surface 24 of form 20.

[0028] Cavities 26 optionally include holes 27 that extend from front face 22 through rear face 24. It can be appreciated that holes 27 are not limited to being disposed within cavities 26 and may be disposed anywhere along front face 22 of form 20. However, holes 27 are not always desired since they can affect the appearance of the finished product.

[0029] The rear surface 24 of form 20 includes an integral honeycombed reinforcement matrix 30 which extends away from rear face 24. Rear face 24 also includes base portion 28 of form 20. In the illustrated embodiment, reinforcement matrix 30 includes a plurality of horizontally and vertically extending braces 32, 34 integral with base portion 28 of form 20. In some instances, cavities 26 may intersect braces 32 or 34, thereby providing cavities 26 with additional structural support. In general, braces 32, 34 are equally spaced from each other. However, as shown in Figure 2A, spacing of braces 32, 34 may be non-uniform in regions where additional rigidity or support is required to minimize unwanted movement of form 20 when in an installed orientation. In the illustrated embodiment, braces 32, 34 representing the outer periphery of the form 20 are wider in dimension "A" than the inner braces. However, the braces 32, 34 representing the outer periphery of form 20 may also be

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of the same thickness as inner braces. It is also envisioned that additional bracing, such as members extending diagonally between select horizontal or vertical braces, may be helpful for some applications. For example, additional bracing may be required when a very deep pattern is used, such as one that extends inwardly from the front face 22 to a significant percentage of the total thickness "T" of form 20. Another example may be when a particularly complicated pattern is desired. Thus, thickness, depth, numbers, and orientation of the braces 32, 34 may all be modified as desired to provide the optimal balance between weight and necessary rigidity of form 20 based on the pattern being used.

[0030] Figures 3 and 4 illustrate an alternate embodiment of the present invention. Reinforcement matrix 30' of forms 20' include webbings 35 and supports 37 and 37'. Supports 37 and 37' are intermittently spaced between sections of webbings 35. The webbings 35 include orifices 33. The orifices 33 provide webbings 35 with a cushion to protect form 20' against inadvertent side impacts, especially during assembly and disassembly of forms 20' when webbings 35 may be physically struck. In essence, orifices 33 absorb a substantial amount of the force exerted on reinforcement matrix 30'. Moreover, webbings 35 allow for weight reduction of form 20'. As illustrated, webbing 35 may be positioned in close proximity to another webbing 35 for additional cushioning. Moreover, placing two webbings 35 in close proximity to one another allows form 20' to be divided into sub-units (not shown) if desired. Accordingly, each sub-unit may include at least one webbing 35. It should be noted that while Figures 3 and 4 illustrate orifices 33 varying in size, orifices 33 may also be of uniform size.

[0031] Figure 5 illustrates form 20' as having a staggering vertical outer periphery. The staggering vertical outer periphery of form 20' may assist a user when joining two or more forms 20' together. The staggering outer periphery of form 20' provides for easier alignment of adjoining forms 20', than the straight outer periphery of forms 20. Moreover, once forms 20' are secured together, the staggering outer peripheries of forms 20' provides a greater retaining force of forms 20'. Figure 6 illustrates adjoining forms 20' positioned to form an interlocking unit. Securement of forms 20 and 20' are discussed in greater detail below. While the present invention illustrates the vertical outer periphery as being staggering, the present invention can

also be practiced with the horizontal outer periphery as being staggering. It should be further noted that reinforcement matrix 30' of form 20' may be interchanged with reinforcement matrix 30 of form 20. Furthermore, reinforcement matrix 30' performs substantially the same function as reinforcement matrix 30 and provides the same advantages as reinforcement matrix 30 as well as the additional advantages noted above.

[0032] As best illustrated in Figures 3, 4, 5, 6, 12, 13, and 15 outer vertical brace 34 of form 20 includes a plurality of openings 40 spaced between top 44 and bottom 46 of form 20. Openings 40 are located between recess 45. Recesses 45 are discussed in greater detail below. Additionally, horizontal braces 32 associated with top 44 and bottom 46 of form 20 may also include openings 40, and recesses 45, spaced along each horizontal brace 32.

[0033] Openings 40 assist in constructing an overall wall forming system 50 in accordance with various embodiments of the present invention as shown in the Figures. Wall forming system 50 includes a plurality of forms 20. Forms 20 are aligned such that openings 40 of adjacent forms 20 line up with each other when forms 20 are being assembled into wall forming system 50. There is no requirement that openings 40 be equally spaced apart. In practice it has been found to be most beneficial to have openings 40 closely spaced together in the center of form 20 and more widely spaced near top 44 and bottom 46 of form 20, as best illustrated in Figure 7.

[0034] During assembly of forms 20 into the wall forming system 50, a series of male members, such as bolts 52, may be used to secure forms 20 together. Bolts 52 can be inserted through mating openings 40 of adjacent forms 20 and then secured. Traditionally, bolts 52 are threaded, allowing a nut (not shown) to be threaded onto bolts 52. However, the use of such a conventional fastener can be time consuming to assemble and disassemble.

[0035] Figures 7 and 8 illustrate one embodiment of the present invention. A friction based securement member illustrated as a friction based wedging member 54, is used as part of a retention mechanism 56. Retention mechanism 56 further includes bolts 52. Wedging member 54 is wedged between base portion 28 of form 20 and bolt 52. Typically, wedging member 54 is thinnest at one end and thickest at an

opposing end to form a ramp-like member. As illustrated, wedge member 54 is wider at the thicker portion and narrower at the thinner portion. Applying a force at the top of wedging member 54, in a direction generally perpendicular to the desired movement between bolt 52 and form 20, forces the thicker portion of wedging member 54 to lodge between bolt 52 and form 20. The shape and design of wedging member 54 is such that a person in the field will be able to easily identify the proper orientation of wedging member 54 for installation. However, on the other hand, the design of wedging member 54 does not prevent installation of wedging member 54 when wedging member 54 is rotated 180 degrees. If such an orientation of wedging member 54 is desired, then the installer may simply hold wedging member 54 in place while hammering. Wedging member 54 is concave to facilitate its insertion between bolt 52 and base portion 28 of form 20. The concave shape of wedging member 54 also facilitates the application of force on the bottom portion of wedging member 54 to dislodge wedging member 54 once wall forming system 50 is to be disassembled. Wedging member 54 may be formed of a material having characteristics which allow wedging member 54 to compress under load without damaging either form 20 or bolt 52. In an alternative embodiment, wedging member 54 may be formed of the same material as form 20, while bolt 52 may typically be metallic, and preferably formed from an iron-based material. In a further alternative embodiment, wedging member 54 may also be metallic so as to minimize damage caused to wedging member 54 from bolt 52 during assembly of wall forming system 50. Form 20 provides compressive capabilities to further assist in retaining bolt 52 and wedging member 54. Additionally, as illustrated in the present invention, braces 32, 34 are offset from openings 40 and reinforcement mechanism 56 to permit the use of either wedging member 54 or traditional threaded connections.

[0036] Figure 9 illustrates an alternative retention mechanism 56' that may be practiced with the present invention. As illustrated, wedging member 54' is integral with form 20. To avoid interference with bolts 52, wedging members 54' are only disposed on a common side of each form 20. Retention mechanism 56' includes an opening 58 along the lateral extent of wedging member 54', generally equally spaced from an upper end 60 and a lower end 62. Outer periphery of opening 58 is preferably less in diameter than bolt 52 to be inserted, creating a friction fit as

wedging member 54' is inserted into bolt 52. The material on either side of opening 58 provides resistance and support to opening 58, facilitating retention of bolt 52. It can be appreciated that the present invention is not limited to the retention mechanisms disclosed above, but can be practiced with other approaches to integrating wedging member 54' to form 20. For example, the portion of wedging member 54' adjoining an opening 40 may be thinner than a portion spaced away from opening 40 along the path of travel of bolt 52. It can be appreciated that wedging member 54' may be integrated with form 20 in any manner so long as wedging member 54' is integrated with form 20 and friction is used to retain bolt 52, while permitting easy removal once wall forming system 50 is to be disassembled.

[0037] Figure 10 is a further alternative embodiment of retention mechanism 56'' that may be practiced with the present invention. Retention mechanism 56'' includes a wedging member 54'' and bolt 52. Wedging member 54'' may be wedged between base portion 28 of form 20 and bolt 52 as in Figure 8, or wedging member 54'' may be integral with form 20 as in Figure 9. Wedging member 54'' is similar to wedging member 54 and wedging member 54' however, wedging member 54'' further includes a lip 55 at the thicker portion. Lip 55 provides a wider surface than wedging member 54 and 54' on which to apply force during installation.

[0038] Wall forming system 50 illustrated in the Figures is often used for retaining walls of the type illustrated in Figure 11. Figure 11 illustrates a finished wall 80 where the material being retained forms the opposite half of the mold for the flowable material. Wall forming system 50 is set up, the flowable material is poured between opposing molds, permitted to cure into wall 80, and then wall forming system 50 is disassembled. The pattern shown in Figure 11 is of rocks jutting out from a base, which is much more defined and detailed then patterns formed by conventional systems. However, it should be noted that the pattern in Figure 11 is for illustration purposes and that wall forming system 50 may be of a different pattern. For example, Figures 12 and 13 illustrate a second pattern that may be used in accordance with the present invention.

[0039] As noted above, forms 20 are positioned adjoining to each other in wall forming system 50. However, forms 20 may not necessarily be adjoining. Figures 12 and 13 illustrate how forms 20 and retention mechanisms 56 create the wall forming

system 50 of adjacent forms 20 according to the present invention. Additionally, spacers 66 are often placed between adjacent forms 20 to assist with proper alignment of forms 20 to create wall forming system 50. Spacers 66 keep opposing sets of forms 20 generally equally spaced from one another and are substantially incorporated into finished wall 80. Spacers 66 may also perform an additional function of forming a mold to receive flowable material to be cured therebetween into finished wall 80. First and second ends 74, 76 of spacers 66 are configured to receive the retaining mechanism 56. Accordingly, first and second ends 74, 76 have an aperture 75 for slidingly engaging bolt 52 of retention mechanism 56 outside the boundary of form 20. Moreover, first and second ends 74, 76 of spacer 66 rest within recesses 45 of forms 20. Thus, when forms 20 are positioned adjoining to each other, forms 20 are substantially flush with respect to each other. Accordingly, the depths of each individual recess 45 is generally half the depth of first or second ends 74, 76. Recesses 45 help to minimize any seam that exists between adjoining forms 20 and that may be visible on the finished wall 80. It should be noted with the staggering outer periphery of forms 20' further assist in hiding any seams that may be visible on finished wall 80 because the seam is not continuous along a horizontal or vertical line.

[0040] Once forms 20 are disassembled, first and second ends 74,76 of spacers 66 remain outside the boundary of finished wall 80. To facilitate removal of first and second ends 74, 76 of spacer 66 after construction, spacers 66 may be scored at a dividing line 72. The location of dividing line 72 is dependent on the thickness of finished wall 80; dividing line 72 separates the portion of spacer 66 that remains embedded in the finished wall 80 from the portion of spacer 66 that juts out of the finished wall 80. However, it can be appreciated that dividing line 72 may be disposed anywhere along spacer 66 and may be any multiple numbers of scoring lines. Removal of first and second ends 74, 76 of spacer 66 from finished wall 80 only requires a slight tap of a hammer to first and second ends 74, 76.

[0041] Figures 14 and 15 illustrate an alternative spacer 90 according to the present invention. Conventional spacers are either all flat or all round. Flat spacers generally allow for easier assembly of form 20 while round spacers may be more durable. Moreover, round spacers generally more aesthetically pleasing because once construction is complete, the portion of the round spacer that remains within finished

wall 80 is less noticeable on the surface of finished wall 80. However, it is generally more difficult to insert bolts into round spacers. As shown in Figures 14 and 15, spacer 90 combines advantages of conventional spacers into a new spacer, without the corresponding disadvantages. Spacer 90 has both a flat portion 92 and a round portion 94. Flat portion 92 further includes apertures 96 for receiving bolt 52 of retaining mechanism 56. Round portion 94 of spacer 90 is substantially incorporated into finished wall 80, while flat portion 92 remains outside the boundary of finished wall 80. Similar to first and second ends 74, 76 of spacers 66, flat portions 92 of spacers 90 rest within recesses 45. Moreover, to facilitate removal of flat portions 92 after construction, spacer 90 may be scored at one or more dividing lines 98. The location of dividing line 98 is dependent on the thickness of finished wall 80; dividing line 98 separates the portion of spacer 90 that remains embedded in the finished wall 80 from the portion of spacer 90 that juts out of finished wall 80. Removal of flat portion 92 of spacer 90 only requires a slight tap of a hammer to flat portion 92. Figure 15 illustrates spacer 90 in an installed position within wall forming system 50.

[0042] Spacer 90 may be manufactured using any conventional techniques for forming metal parts. For instance, a round section of metal may be used for the round portion 94 of spacer 90. Flat pieces of metal may be welded to the round section of metal for create the flat portion 92 of spacer 90. However, the preferred method of manufacturing spacer 90 is by using a progressive stamping operation on a flat piece of metal. The round portion 94 of spacer 90 may be machined from the flat piece of metal through progressive tooling techniques, while the flat portion 92 of spacer 90 maintains the shape of the flat piece of metal.

[0043] As stated above, Figures 3, 4, 5, 6, 12, 13, and 15 shows a plurality of openings 40 along upper and lower outer horizontal braces 32 of form 20. Thus, forms 20 may be stacked vertically along horizontal braces 32, and are not limited to being connected along vertical outer braces 34. Retention mechanism 56 is identical for retaining forms 20 stacked vertically upon each other.

[0044] Moreover, under certain circumstances, such as when openings 40 are not accessible, but opposing forms 20 must be maintained in a fixed position, spacers 90' may be used with respect to holes 27. In a simple embodiment illustrated in Figure 16, threaded bolts, acting as spacers 90', pass through mating holes 27 of each

opposed form 20 and nuts 99 optionally engage the rear face 24 to maintain each form 20 in a fixed orientation with respect to spacer 90'. Once use of forms 20 is complete, nuts 99 engaging rear face 24 may be removed. Spacer 90' may be scored in a manner similar to that discussed above to remove portions of spacer 90' that extends outwardly from finished wall 80. Alternatively, spacer 90' may be used as a fastener for items to be screwed to finished wall 80 such as studs.

[0045] Road curbs may also be manufactured using a curb form 100 similar in concept to form 20, and substantially incorporating the features and advantages of form 20. Figure 17 illustrates curb form 100. Curb form 100 includes a front portion 102 and a rear portion 104. Front portion 102 includes a tapered panel 106. Tapered panel 106 may be designed as per government or industry regulations for road curb structures. Rear portion 104 comprises a solid face 108 and a reinforcement grid 110. Reinforcement grid 110 generally resembles reinforcement matrix 30 of form 20. Moreover, reinforcement grid 110 performs substantially the same function as reinforcement matrix 30 as well as provides the same advantages as reinforcement matrix 30. It should be noted that reinforcement grid 110 may also resemble reinforcement matrix 30' of form 20' and perform substantially the same function as well as provide the same advantages of reinforcement matrix 30' of form 20'.

[0046] Curb form 100 includes openings 112 for engaging spacers and retention mechanisms. As with forms 20, curb forms 100 may be joined together by retention mechanisms to create a plurality of connected curb forms 100, depending on the desired length of the finished road curb. Similarly, spacers 66 or 90 may be used to properly align the first and second portions 102, 104 of the curb form 100 and may be integrated into the finished road curb. Once first and second portions 102, 104 of curb form 100 are connected by spacer 66 or 90, flowable material is poured between first and second portion 102, 104. The flowable material is then cured into the finished road curb.

[0047] There are numerous advantages to manufacturing at least key components of form 20 and form 100 from a non-wooden and non-metallic material such as plastic. Forms 20, 100 are also very light in weight, permitting the ready movement, assembly, and disassembly of forms 20, 100 at a construction site. Yet, because forms 20, 100 are non-metallic, the forms 20, 100 are much more resistant to slight

dings or bangs that would otherwise deface a metallic form with an etched pattern. In the case of damage to forms 20, 100, repair may be possible at an actual job site, using plastic repair kits known in the art, and without having to rework the entire pattern. Further, because the pattern is integrated into base portion 28 of forms 20, 100, unwanted movement of the pattern with respect to the rest of forms 20, 100 is eliminated, in contrast to the use of conventional thin liners.

[0048] In a preferred embodiment of the invention, entire forms 20, 100 are completely integral, formed as one piece. In one embodiment, key components of forms 20, 100 are created using a molding process. In an alternate embodiment, forms 20, 100 are created by computer numerical control (CNC) machining. CNC machining allows forms 20, 100 to have a custom shape and custom size. In a further alternative embodiment of the present invention, the molded material is a polypropylene copolymer such as that sold under the trade name Pro-fax ™. Thus, forms 20, 100 may be manufactured at very low cost, permitting the creation of many different molds with different patterns depending on the desired application. The material may include a variety of fillers such as fiberglass strands to provide additional stiffness and rigidity to forms 20, 100, while still minimizing weight and providing flexibility against potential nicks or gouges. For instance, the flowable material used to create finished wall 80 does not bond with the material of forms 20, 100 during the curing process. Therefore, forms 20, 100 require minimal cleaning after the flowable material has been cured and forms 20, 100 have been removed. Moreover, there is minimal, if any, contact between the flowable material and retention mechanism 56. Thus, rusting of the metal components of retention mechanism 56 may be substantially reduced over time.

[0049] Additionally, forms 20, 100 are not porous like wood and thus, do not absorb any water from the flowable material. Therefore, forms 20, 100 do not have to be sprayed with a coating prior to use to prevent water absorption, nor do forms 20, 100 deteriorate over time due to water damage. Moreover, holes 27 of forms 20, 100 allow the flowable material to breathe and thus, drain out any excess air and water retained in the flowable material. As a result, finished wall 80 may have a finer surface texture than with conventional forms. Along those same lines, forms 20, 100 may be used to create a colored finished wall 80 without reducing the reusability of

the forms. Forms 20, 100 may be coated with a powder or acid which mixes with the flowable material to create a colored flowable material. As stated above, unlike conventional forms, forms 20, 100 are not porous and therefore, do not absorb the color of the flowable material. Thus, forms 20, 100 may be used to make finished walls 80 of several different colors, without affecting the color of the finished wall 80 or the reusability of forms 20, 100.

[0050] Forms 20, 100 are not limited to creating a generally planar finished wall 80 as illustrated in Figure 8, but may also generate curves, radii and fillers to create corners for finished wall 80. Accordingly, forms 20, 100 may be molded to create a complete wall, including corners, without the use of additional molds for the corners. Moreover, forms 20, 100 may be altered for use in an area where a full size form 20, 100 would not properly fit. Forms 20, 100 may be cut on location at a construction site due to the nature of the material of forms 20, 100 without affecting the quality or formation of finished wall 80. On the other hand, forms 20, 100 may be joined together to form any irregular shape or size for finished wall 80. It should noted that while forms 20, 100 are depicted as being joined to form generally rectangular-shaped walls, forms 20, 100 may be joined as staggering units to divide and possibly hide any seams that may exist on the finished wall 80.

[0051] The embodiments disclosed herein have been discussed for the purpose of familiarizing the reader with novel aspects of the invention. Although preferred embodiments of the invention have been shown and described, many changes, modifications and substitutions may be made by one having ordinary skill in the art without necessarily departing from the spirit and scope of the invention as described in the following claims.

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